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JULY–AUGUST, 1958

ANIMAL KINGDOM

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ANIMAL KINGDOM

Bulletin of the New York Zoological Society

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A Useless Law

AT THE PRESENT moment a new piece of legislation is before Congress, which represents a fine example of a "useless law." It is H.R. 12126 and calls for a ban on the import of wild ruminants from abroad. This proposed legislation has passed the House and is now before the Senate. Should it be enacted, it would mean that hereafter such remarkable animals as giraffes, okapi, antelopes and other hoofed and horned animals could not be brought into this country.

The purpose of this legislation is avowedly to prevent foreign wild animals from bringing in disease which might affect our own domestic animals. The fact is, however, that existing quarantine regulations are so thorough and so well applied that no single case of hoof and mouth disease has ever been attributed to wild animals that have passed through the government's quarantine. Further, the number of wild ruminants imported annually during the past ten years is very limited. As another practical matter, all large public zoos are located in urban areas where the collections have no direct contact with domestic herds.

More than 60 million people visit the public zoos in our country each year. If the proposed legislation should be enacted, visitors to our zoos will never have the opportunity of seeing many remarkable animals from other parts of the world after the existing collections die out.

Together with other zoological parks, we are making every effort to prevent passage of this unnecessary and undesirable law.

Fairfield Osborn

Paul, Pamela and Patty--

Platypuses in the Zoo Again

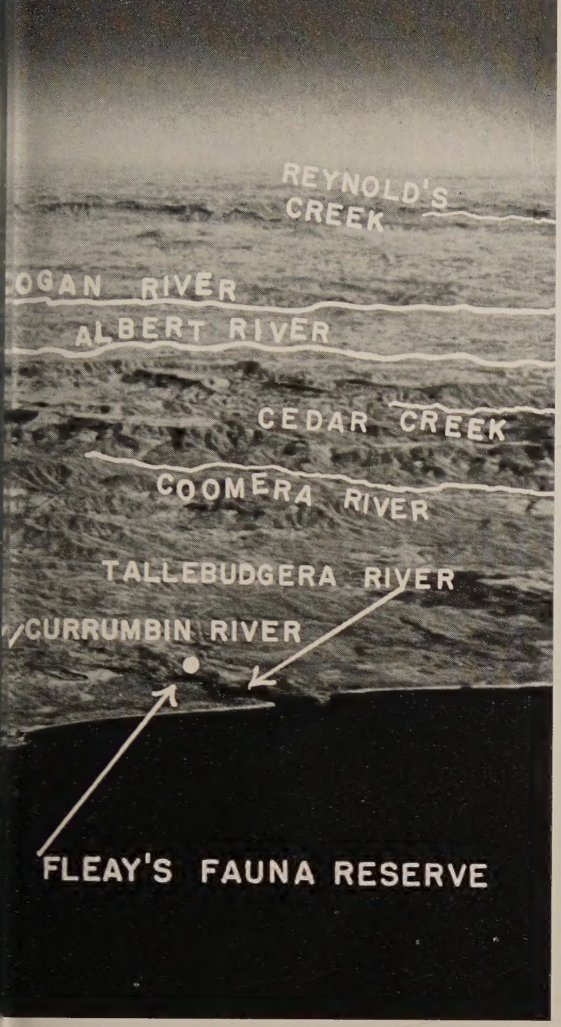
By DAVID FLEAY

Fauna Reserve, West Burleigh, Queensland, Australia

IN AN AERIAL PHOTOGRAPH the eastern coast of Australia looks rugged. It is. Not, perhaps, to the holiday-making people of Brisbane and further-away cities who lie on the sandy beaches at Christmas and revel in the sub-tropical warmth of southern Queensland, but when I look at that photograph I translate every wrinkle and every fold in those foothills and mountains into obstacles to the capture of Duck-billed Platypuses.

Even now, when it is all over and Paul, Pamel and Patty are seemingly settled in their commod ous Platypusary in the Bronx Zoo and I am o the eve of returning to my home overlooking on of the loveliest of the Queensland beaches, I fin it hard to relax. It will be a long time before th tensions of the past six months drain away.

When the New York Zoological Society i 1946 asked me to capture, condition and tran port three Platypuses to the Bronx Zoo, the jo

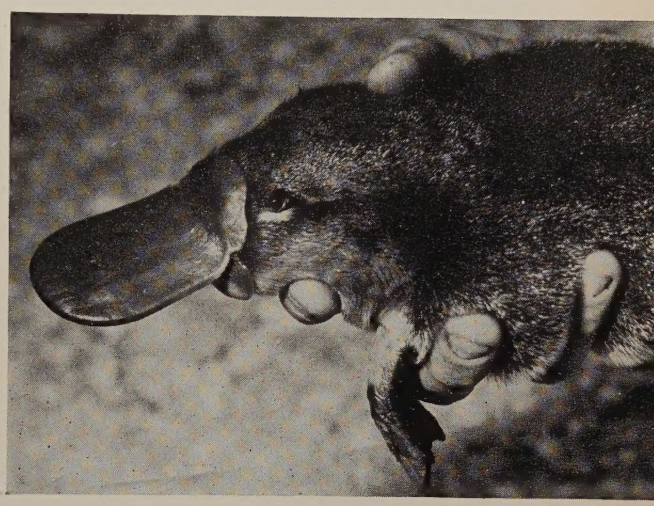


From his home at West Burleigh, Mr. Fleay had to range more than a hundred miles inland, in extremely rough and broken country, to reach the rivers and small streams inhabited by the Duck-billed Platypuses he brought to New York. Altogether he drove about 8,000 miles.

Photo by Courier-Mail, Brisbane.

presented obvious but, I felt, surmountable difficulties. For one thing, I was living in Victoria, a thousand miles to the south of my present home, and it was a good "Platypus season;" these furry little links between reptiles and present-day mammals were reasonably plentiful in several streams roundabout. Indeed, in only three weeks of hunting, I caught 19 from which it was no trick at all to select three beauties – Cecil, Penelope and Betty. For a year I kept them in the Sir Colin Mackenzie Sanctuary in Healesville until they were thoroughly accustomed to visitors and the routine of daily exhibition. Then came a lei-

PAUL



PAMELA

PATTY

surely, month-long journey by sea from Australia to America. There *were* incidents, of course, but how minor compared with those of the past few months!

When Dr. John Tee-Van wrote me near the end of 1957 to confirm what the Australian newspapers had already reported in detail – that Penelope had disappeared and Cecil had died 49 days later (Betty having died in 1948) – I had been thinking for some time how I would go about it if the Zoological Society wanted me to try again. First, permission of the Queensland and Commonwealth Governments would have to be obtained, for the Platypus is one of our most strictly protected animals. Permission, I thought, would be likely to be forthcoming, in view of the Zoological Society's remarkable record in keeping Cecil and Penelope for more than ten years.

The thing to do, I decided, was to capture very young animals and condition them rapidly, then to transport them to New York by air as Dr. Tee-Van suggested. About air transport I had my doubts, for Platypuses are definitely not air-minded and are apt to show their resentment of noise and vibration by going off their feed and, in a few days, simply dying. But perhaps youngsters would be more amenable to the air age.

In any event, the Zoological Society planned to send Dr. Leonard Goss out to Australia and transport would be his responsibility. The search for youngsters would be limited by the breeding season; in Queensland, youngsters hatched early in the spring could be expected to be wandering on their own between early January and mid-February. Moderate rains normally fall throughout the spring and summer, feeding rivers which are a rich foraging ground for these crustacean-minded feeders, and I shouldn't have too much difficulty.

The only trouble was that the rains did *not* come on schedule. Rivers and streams fell lower and lower, shrank to waterholes and in some cases mere mudholes. It was going to be a bad year for Platypuses and I more than half suspected that many females did not even set about digging their long burrows and laying their creamy-white eggs. Even the lesser than usual number of Platypuses that hatched were going to have a hard time making a living in a drought-stricken land.

If the Florida Everglades was criss-crossed by hills and slashed by rocky gullies, I suppose that in a drought season in mid-summer it would be a pretty good imitation of coastal Queensland in its spring-summer drought. The flies, the mosquitoes, the algae-choked pools would be the same. And the heat, the oppressive, burning sun.

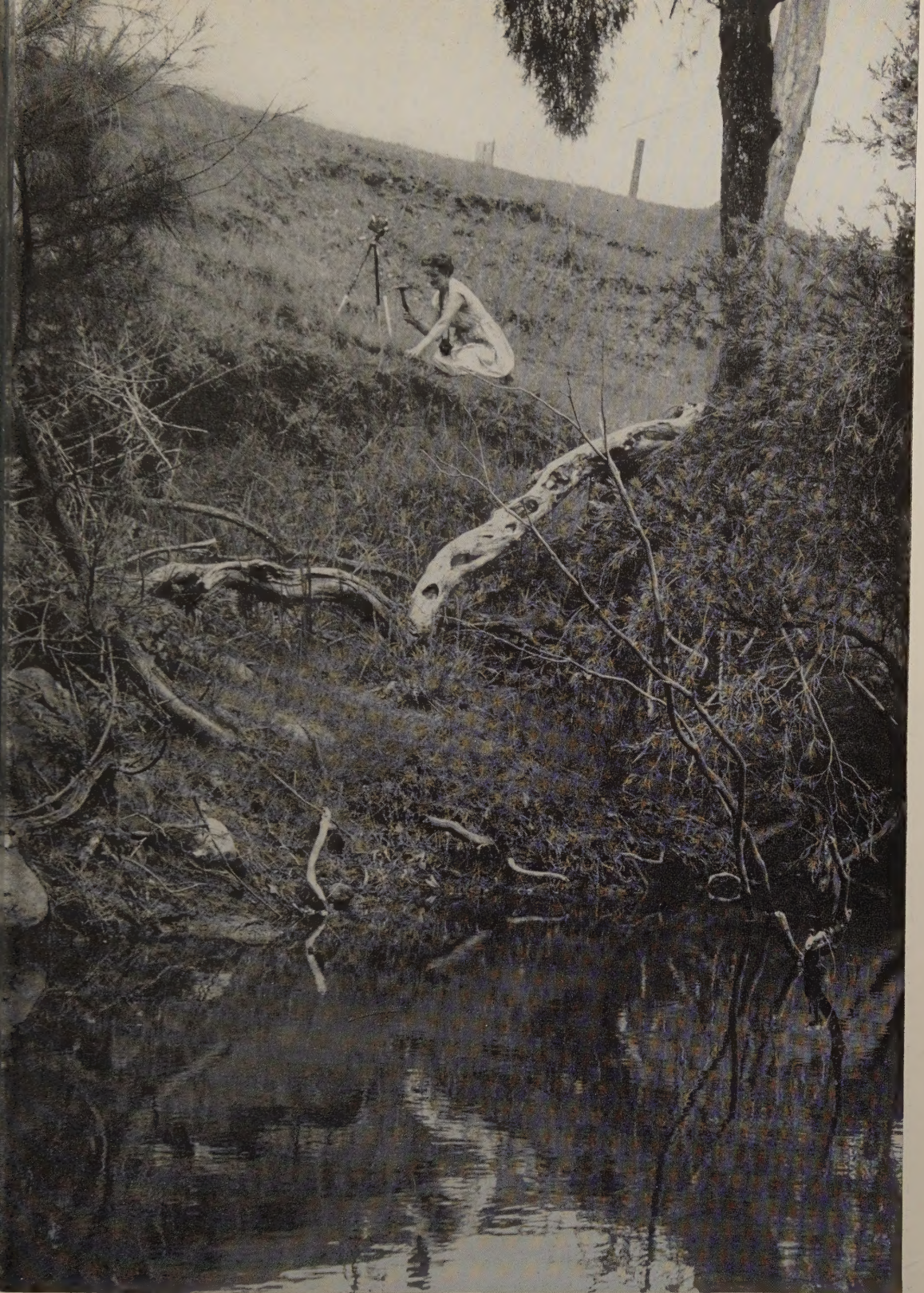
Early morning and sundown are the best times to seek Platypuses, for they feed at night and in the waxing or waning light one is most likely to catch a glimpse of the widening circles of water in some pool where a Platypus has crash-dived. And one must work alone, too, at least at first, for if there was ever a shy, timid, easily frightened animal, it is a Platypus. Lonesome work it had to be, then, until I actually located a Platypus and could bring in a helper if necessary to set the traps.

I shan't soon forget the dawn on the morning of January 22, for it was then that I saw the first of those telltale ripples. I had glimpsed them from a distance of several yards from the edge of the Albert River, suspected that a Platypus had caused them, and slowly sank to my knees and began to crawl toward the bank behind a screen of bottle-brush. Sure enough, a tiny, thin, baby Platypus was nuzzling and puddling in the mud of the shore. One glimpse was all I had, for it sensed or saw me and dived.

I froze – figuratively, only. For an hour there was nothing to do but to endure the heat and let the mosquitoes have a field day, for I dared not move to brush them away even momentarily. My stoicism paid off, for eventually the baby came up from under a clump of roots. I was in a position to cut off its retreat to the deeper part of the river and it chose to scramble over rocks and through rivulets to deeper water upstream. It started upstream and I started after it, and for the time being the baby won: it disappeared in a winding crevice of rock.

Next to catching it immediately, the best thing was to know just where it was living and feeding. That night I set up my underwater fences in the most likely nearby pool and the following morning Pamela, my first capture, was safe in the trap where the fences converged.

She was, I figured, four months old at that time. She was thin and woefully undernourished and I doubt that she could have survived much



A Platypus lives here. Betty Fleay, the author's daughter, is digging into the site of a nesting burrow at the top of the bank of Palen Creek. The actual burrow entrance is visible as a round, dark spot about a foot above the water, alongside a curved white stick, near the center.

All photos by the author unless otherwise credited.

longer under those terrible conditions of drought.

Within a few hours Pamela was in the special Platypusary I had built at our Fauna Reserve in West Burleigh, and to my delight she showed a complete readiness to eat. Of course, she could take only the smallest of crayfish and worms, but she would eat readily – that was the main thing.

Only four nights later a cage trap in the same section of the Albert River caught a beautiful little male. Things, I thought, were looking up, and for the moment I quit worrying about the monsoon rains that *must* come soon and would turn these fetid ponds into rushing, roaring rivers. This young male, which I named Paul, was one of the best Platypuses I have ever seen. He was in relatively good condition – splendid condition, considering the season – and his coat was sleek and glossy. Furthermore, he was not temperamental; he took fairly readily to captivity and food. Within a few hours he joined half-pound Pamela in the verandah-sheltered, 24-foot-long Platypusary at the West Burleigh Fauna Reserve.

But that was the end of my run of good luck. In the weeks that followed I drove and trampe many, many hundreds of miles within a radius o a hundred miles of home, wearily working th waterways – the Albert, Coomera, Logan, Cur rumbin, Cedar (this last about the size and habit of the Bronx River as it flows through West chester County), and Palen and Burnett's Creeks Sometimes I endured the heat and the mosquitoe alone, sometimes with Colin Veivers of Ceda Creek. We grew all too accustomed to being startled as big water lizards dropped from over hanging Bean trees into the river pools. We grew resigned to the dashing of our hopes as we made dawn visits to the traps and saw the water swirl ing as it would if we had a Platypus – invariably the swirl was caused by an eel, or freshwate crabs, or tortoises, or catfish, or poison-finned bull routs or freshwater mullets. We had, it seemed run out of luck – or Queensland had run out o Platypuses. The month of February passed in growing despair.

Early one March morning Colin visited ou seven traps and out of one pulled an ancien

female Platypus, almost blind and certainly far past her prime. We returned her to the river, for since a Platypus hunts food below the surface with eyes and ears closed, blindness would be no particular obstacle to survival.

One episode I should not like to recall if it had not produced a Platypus. That was the time we camped on Palen Creek, 95 miles from home, arriving after dark and setting our traps on speculation in a long, dark and rather smelly pool. It was not until the next morning that we discovered that the pool contained the carcass of a drought-stricken bullock — which explained, too, why our tea the night before had had a rather gamey flavor. But what does make the incident worth remembering was that our traps the next morning contained a fine young male, almost as good as Paul.

We named him Paddy. We had wanted another female, but the season was now so late that we considered ourselves lucky to have three young animals of whatever sex. It *was* just chance.

Nevertheless, the search persisted. For the first part of March the rains held off and the possible Platypus-harboring sites were comparatively few, so that we felt the population might be concentrated. Certainly there was no lack of evidence that Platypuses *had* been in the Palen Creek area; here and there in the banks we could see the entrances to their burrows, with their flat, oval doorways. Nevertheless, we caught only one animal, an unsuitable, adult male.

The rains came in torrents in mid-March, and so did letters from the New York Zoological Society urging us to persist and try to the very end to get two females and a male. We persisted but the rivers and creeks were now bank-full and the rushing waters carried traps away as fast as we could set them up. It was for the most part a desultory kind of persistence, without any real hope. No wonder our road mileage eventually totalled 8,000 miles!

Back at the Fauna Reserve Paul and Pamela and Paddy were behaving beautifully. I put them on a regular routine such as they might encounter in New York, awakening them every afternoon at 3:20 o'clock for their feeding and exhibition to visitors. They took it well, providing we gave them background "music" of falling water, and thrived, so that the food problem became acute. Our own adult male named Percy had to be fed, and the three extra mouths meant that we needed some 3,000 earthworms, countless meal grubs and 40-odd crayfish every day. As long as the drought lasted, all these items were progressively harder to find and at one point I had to push the price of crayfish up to threepence each, of whatever size.

From the very beginning I had had qualms

pus traps set in the Albert Paul was captured in the on the right, Pamela in the at the left. At one time traps were in operation.

Paddy, the four-months-old male, was a little beauty, but he was so upset by a test flight in an airplane that he had to be liberated in the Currumbin River.

about air transport, remembering that the Platypuses went off their feed in 1947 at the very start of their trip to New York as the aftermath of a comparatively brief flight of 1,000 miles to catch the ship. So I made an arrangement with Trans-Australia Airlines whereby Paul, Pamela and Paddy, Mrs. Fleay and I, and a couple of magazine correspondents, made a 120-mile flight to Brisbane and back.

Everything seemed satisfactory in Brisbane, but back home they were slightly dazed and that night they refused to eat. Paul and Pamela had recovered within 24 hours, but Paddy was going down fast. Another 24 hours and I liberated him in nearby Currumbin River. He simply wasn't temperamentally capable of surviving the long trip to New York.

So there we were, near the end of March, with only two Platypuses. The rivers were rising and falling, the traps were being washed away and sometimes surviving a night or two. One night in the Albert I caught a huge male — 20½ inches from the tip of his rubbery bill to the end of his tail. He weighed four pounds. He was of no use to us and we turned him loose after photographing him digging his venom spurs into my rolled-up swimming togs.

Spring was coming to New York, but winte was approaching in Queensland and it was n longer pleasant to wade into the rivers to set an visit the traps.

Between expeditions I designed and built miniature Platypusary that would be home t Paul and Pamela and a possible third Platypus o the air trip to New York. It was 6 feet long, feet wide and 3 feet high, and as light and com pact as ingenuity could make it. There was shelf-protected, bondwood swimming pool, grass padded tunnels and drying devices. Nevertheless it weighed 200 pounds without water.

Every second night Paul and Pamela were transferred to this travelling Platypusary, to ge

Male Platypuses have venom spurs on their hind. A big male 20½ inches lo here shown hanging by his from cloth. He was turned

A close-up of young Paddy whose dislike for flying was the only thing that kept him from coming to New York. Notice how plump a well-nourished baby is.

them accustomed to it. At first they ate very little and spent most of the night trying to escape. Gradually I changed the burrow system and the landing board until they settled down. On such small details do success or failure so often depend — when you are dealing with Platypuses.

It was about this time that a letter from New York changed my personal plans: Dr. Goss would not be able to come out to Australia, and would I carry on to the very end and deliver the animals to New York? Of course; there was nothing else to do.

As departure time drew near we learned to our dismay that Plant Quarantine Regulations of the U. S. Department of Agriculture would not permit Australian soil to be brought into Hawaii, where the Pan-American plane would set down en route to New York. This was critical, for Platypuses require a certain amount of mud in the water as they nuzzle and puddle for their food, and we had planned to carry their earthworm food in a five-pound can of Australian soil.

Just to make sure, we washed a night's feeding of earthworms and crayfish and offered them to Paul and Pamela without soil. They refused to eat, and we lost 2,000 earthworms and a good assortment of crayfish — for Platypuses will eat only live food.

Cables between Australia and America and Hawaii passed frequently, and at full rapid rates, for some days and finally it was all worked out — we could bring the Australian soil into Hawaii, but it would be seized and destroyed after the worms had been removed, washed in Hawaiian water and replaced in sterilized Hawaiian soil for the rest of the trip.

Just to make sure that we had no more incidents like the one in 1947, when the Platypuses ran out of food and the Zoological Society had to fly 10,000 earthworms to Panama to meet the boat, I requested that 5,000 earthworms and 5,000 mealworms be airmailed to Hawaii well in advance of our expected arrival. The worms could be shipped in sphagnum moss to save weight, then transferred to Hawaiian soil at least a week before we arrived. That way, they would have the taste of soil to the Platypuses. We knew by experiment that Platypuses will not eat earthworms that have been stored in sphagnum moss right up to mealtime.

Earlier I wrote of our "desultory persistence" in seeking another female. That persistence won. On May 10, in a last desperate try in the narrows of Cedar Creek — right in the middle of a cow pasture — we caught another young female. Colin Veivers had ridden out to check the trap without even carrying a bag, so certain was he that we would have no luck. But there *was* a Platypus in the trap, and Mrs. Veivers phoned excitedly to say that Colin had arrived home with the Platypus wrapped up in his shirt.

The recalcitrant young male we had called Paddy; sticking to alliteration, we named the newcomer Patty. She was older than we would have preferred, probably in her second year, but she was quiet and steady and settled in well with Paul and Pamela. It had been a narrow squeak, but we had just about what we and the New York Zoo wanted: one fine male, and two fine females.

THE SKY was still black and star-studded at 4 a.m. on June 3 when we lifted Paul and Pamela and Patty out of their swimming pool in the big Platypusary in West Burleigh and slid each one into a small, wooden, grass-filled individual carrying case. The Travelling Platypusary had been shipped ahead to Sydney by freight plane and we were to follow with the youngsters in these temporary boxes.

It all began auspiciously. There was no trouble motoring the 65 miles to Brisbane Airport with the babies and their food supply of 10,000 earthworms, 2,500 meal grubs and 550 crayfish. I had bought a thick pad of sponge rubber to cushion the road shocks, and at Brisbane the Trans-Australia Airlines people had provided relatively vibrationless rear seats in a Vickers Viscount.

Another kind of shock began in Sydney. The Pan American Airways plane was delayed in Fiji and it would probably be 48 hours before we could take off for New York.

There was nothing for it but to install the three Duckbills in the Travelling Platypusary in one of the Pan Am hangers and hope for the best.

The best was not very good, for two days' delay meant that we should run out of food even before we got to America. I telegraphed to West Burleigh to start digging earthworms again — I needed at least 2,000 more, and at least 50 more crayfish. Fortunately there is frequent plane service between Coolangatta (West Burleigh) and Brisbane, and Brisbane and Sydney, and an "earthworm-crayfish airlift" was established. A second shipment of food arrived on June 5, and none too soon, for all the original lot of worms had been consumed. A Sydney hospital sterilized more earth for us.

At noon on June 5 the Pan American plane finally took off with the Travelling Platypusary strapped down on its rubber cushion in the cargo hold, which was also pressurized and temperature-controlled. Because of the two-day delay, the Platypuses started for America in a somewhat restive condition, and I was not greatly surprised when I checked their condition two hours after takeoff to find that Paul and Pamela were frantic, swimming excitedly, rearing up in the corners and falling backward into the water. Behavior of all three rapidly deteriorated. The cause of their disturbance was, of course, the terrific noise and vibration of the four engines pounding away only a few feet on either side.

The first stop was Nandi Airport in Fiji. By that time, wet and bedraggled, the three Platypuses had disappeared into their burrows.

Another takeoff, this time for Canton Island. Dead earthworms and crayfish floated under the landing boards in the Platypusary; the babies had not eaten. By now I was convinced that they would not survive to reach America.

The one spot I dreaded was Honolulu, for it had been agreed that at this first port of call in U. S. territory, the Australian earth would be changed and all grass bedding would be destroyed.

This is one night's meal for an adult Platypus. Earthworms and chafer grubs and frogs (in the bottle) are the equivalent of half the weight of the animal.

Mr. and Mrs. Fleay on the rival at Idlewild on Jun and the Platypuses, each separate small box in whi trip from Los Angeles was

Photo by M. Castora

nd replaced with Hawaiian bedding – which neant a complete and thorough upset of the Platypuses' lives while they were at low ebb.

It was just as bad as I feared. By the time Mrs. Fleay and I had been courteously escorted hrough Customs, Health and Immigration formalities, the inspectors had removed the whole Platypusary from the plane without waiting for ne to drain the tank – and the water had ooded into the normally dry burrows.

All around us planes were taking off and landng and the air quivered with sound. It was the worst possible condition for disturbing the Platyuses, but it had to be done and so, feeling at omplete low ebb myself, I began removing the aked bedding. I fully expected to find three old little corpses in the tunnels.

But I didn't. Paul, Pamela and Patty were undles of nerves, but they were alive! Patty was bviously thinner – a result of not eating.

Paul Breese, Director of the Honolulu Zoo, as standing by to help us and help he did. He ad brought the earthworms and mealworms that he Zoological Society had shipped to Honolulu n advance, and he produced quantities of deightfully soft Hawaiian grass to repack the burows. Never was a friend more welcome.

Thirty-five flying hours and five days out of Queensland we landed at Los Angeles, where we were supposed to lie over until early evening and then take a United Airlines cargo flight for New York – a flight that would consume 16 hours.

One look at the trio in Los Angeles and I knew they would never make it. The only thing to do was to get them to New York by the quickest and most direct transportation possible. That meant a final dash in a non-stop passenger plane, with the Platypuses each in the small travelling cases in which they had started out from West Burleigh, and it also meant imploring United Airlines to stretch a rule against carrying animals in passenger planes.

In New York Miss Davall was making telephone calls to airline officials; in Los Angeles we were convincing other officials, including the commander of the plane, Captain J. D. Milstead, who had the final say, that Platypuses do *not* smell like skunks (they are quite odorless). Providentially United Airlines gave its consent. At nine o'clock on Friday night, June 6, we took off in the non-stop plane for New York's International Airport. The Travelling Platypusary, empty now, followed on the slower and more circuitously-routed cargo plane.

The "unveiling" of the trio took place in the out-of-doors Platypusary on June 13. Looking on are, left to right: President Osborn, Sir Josiah Francis, the Australian Consul General, and Mr. Fleay who is holding little Patty, the youngster who was least disturbed by the trip.

Photo by Nat Fein, Herald Tribune

Virtually the whole Bronx Zoo staff was waiting at Idlewild at 7:30 on Saturday morning, June 7, eleven years and forty-three days from the date of our other arrival in Boston with Cecil, Penelope and Betty on April 25, 1947. The Platypuses were dazed and shocked, and Pamela had developed a nasal discharge that gave me some concern in the next few days. Paul, I think, would have died if the trip had lasted two more hours. Patty, surprisingly, was best of all.

To my insistence that for the time being the youngsters be given *complete* rest and seclusion in the darkness and quiet of the old Platypusary I had used on the 1947 trip, and which was now set up in the basement of the Bird House as a winter storage place for Platypuses, the staff of the Zoological Park gave entire consent. In Joe Neglia, the keeper assigned by the Bronx Zoo to be the Platypuses' guardian and friend, I found as apt and interested a student of Platypus behavior as I had found John Blair eleven years before.

On Friday, June 13, 1958, after a luncheon in the Administration Building of the Zoological Park at which President Fairfield Osborn expressed the pleasure of the Zoological Society in having Platypuses again, and the Australian Consul General, Sir Josiah Francis, gave Paul, Pamela and Patty a hearty Australian welcome, we adjourned to the Zoo's permanent, out-of-doors Platypusary and a little after 2 o'clock the three Duckbills officially made their debut before — it seemed to me — all the reporters and photographers in New York.

Tomorrow, June 16, Mrs. Fleay and I leave New York to return to West Burleigh, 11,600 miles away in Queensland. Regretful as we are to say goodbye to so many old friends in the New York Zoological Park — and to Paul, Pamela and Patty — we still return with far fewer cares and worries than we had when we set out. The Platypuses are off to a good start, and may they long survive to fascinate Americans — as they do Australians!

Like Everybody Else, Animal Keepers Have Their Favorites

Photographs by SAM FALK
New York Times

For many years Sam Falk has been considered one of the best photographers on the staff of the *New York Times* and the *Times Magazine*. While he never specialized in animals particularly, he has occasionally been a welcome visitor to the Bronx Zoo and recently he drew an assignment from the *Times Magazine* to photograph ten animals which President Osborn selected as especially interesting to the public. Good photographer that he is, Mr. Falk gave his office full measure: he also photographed some of our keepers with *their* favorites – which are not necessarily the public's. His camera studies are reproduced on this and the next four pages, and tell better than words the kind of relationship that exists between good keepers and their animals. *Below:* **JOHN CURRAN'S** favorite is friendly "Bambi," a **WHITE-TAILED DEER** that learned to like people while a resident in the Children's Zoo.

Keeper **ALBERT LANNON** of the Reptile House has no very good reason to be fond of such a normally undemonstrative creature as a **GALAPAGOS LAND IGUANA** except that this one (named Charlie) has responded so well to his keepers' quiet, slow and persistent advances. When Charlie arrived a few months ago he was constantly on the aggressive; now he is quite willing to sit on a lap and have his head scratched.

Keeper **CHARLES PILEGARD** is not a particularly *old* friend of "Bella," the young **CHEETAH**, but Bella is not one to quibble – she likes any of her keepers willing to stop and play with her.

Keeper **MICHAEL QUINN** and our big female **GORILLA**, virtual up together in the Bronx Zoo, a friendship is on a completely basis. Quinn calls her "Doll" and her delicacies from his own tab responds by accepting him as mate, and sometimes even obeyi

Every morning when keeper **RICHARD BERGI** the Small Mammal House approaches the **OTTER**, it begins whining, snuffling and maki sounds that indicate affectionate eagerness to Bergmann usually stops to play for a few minut says, you can't resist an animal that likes you

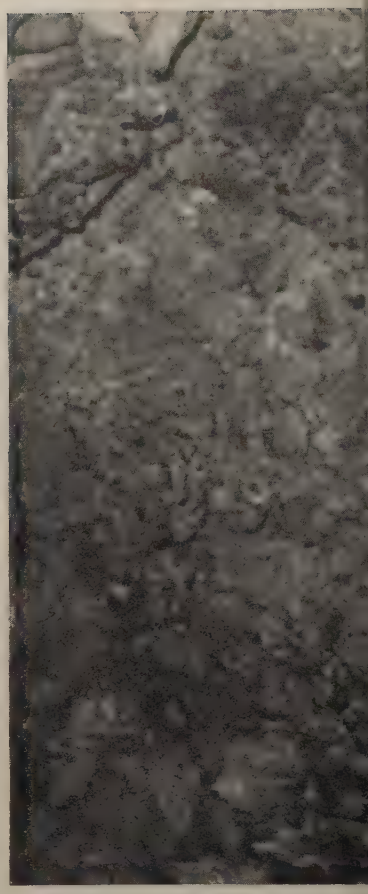
Keeper **RAY CUMMINS** of the Reptile House chooses the **COLOMBIAN GIANT TOAD** as his favorite because "It's the biggest toad in the New World, a real giant, but nobody pays much attention to it — it's just a toad!"

Keeper **JOSEPH NEGLIA** lets this young **AARD-VARK** "chew" on his thumb to demonstrate its friendliness. It's quite safe, for Aard-varks have only cheek teeth. They take food – ants and termites – with the sticky tongue.

"This **GENTOO PENGUIN** is named Tracy and he gives me more trouble than all the others put together, because he's always pestering around underfoot," keeper **SALVATORE SOLANTO** of the Penguin House explained. "That's why I kind of like him most, I suppose."

Some months ago former Head Keeper of Birds George Scott brought a **BRAZILIAN TURKEY VULTURE** back from Venezuela – an appealing youngster still in downy plumage. Since then it has been keeper **JAMES BARDSLEY'S** pride and joy. "Who else," he remarked recently, "is going to like it if I don't?"

Oilbird-watching in Caves



THIRTY-TWO YEARS AGO *this spring the Bronx Zoo exhibited its first and only Oilbird for a brief two weeks. Gloria Hollister, then of the Department of Tropical Research staff, had captured the bird in the Spring Hill estate cave described in Dr. Snow's article on page 117, and managed to keep it alive on the voyage to New York by feeding it on fresh coconut — which she had to chew up first. Even before that spring of 1926 the Department had made some studies of Oilbirds, as Dr. Beebe's reminiscent article indicates. Now that the Department has its base in Trinidad, and Dr. Snow on its staff, the Resident Naturalist is undertaking a prolonged investigation of these fascinating "troglodytes of the bird world."*

All Photos by Dr. Wilbur G. Downs

THE GUACHAROS OF CARIPE

By William Beebe

Director Emeritus, Department of Tropical Research

NEARLY ONE HUNDRED AND FIFTY YEARS AGO Alexander von Humboldt discovered a great cave in northeastern Venezuela, shot one of the strangest birds in the world and later named it *Steatornis caripensis*. This is what we now call the Guacharo or Oilbird, of rich orange-rufous speckled with white, with a stout beak hooked like a hawk's, and a mass of stiff bristles extending forward from the head. It has a wing-spread of more than three feet. In structure it is so peculiar that it has a genus, family and even a sub-order of its own. Its closest relatives are the nighthawks and whippoorwills but its food consists not of insects, but of the fruit of palms and other trees. Finally it is the only bird in the world which nests and spends its entire day in the darkness of caverns.

Humboldt's name means the Tallow or Oilbird of Caripe, that being the nearest village. Oilbird refers to the amount of fat which ensheaths the nestling and whose edibility is the greatest threat to existence of these birds. The Spanish word *guácharo* has nestling as one of its meanings.

Late in March, several years ago, I left Caripito to visit this famous cave. We travelled by car, then on muleback and finally on foot, reaching the cave in five hours. Our route led through diversified country varying from lush jungle with hummingbirds and macaws, to semi-arid cactus-dotted expanses marked by Vermilion Flycatchers and Ground Doves.

The entrance to the cave is a great jagged hole in the side of an enormous, precipitous cliff, the rock showing gray, pink and yellowish. On the left as you approach rises the opposite cliff, equally steep and so directly opposite that it seems as if an entire slice of the mountain had been shorn away. There is a curious depression opposite the cave mouth as if the cave once extended

An adult Gaucharo, or Oilbird, in full flight just under the roof of the cave in Trinidad. It is a big bird to maneuver in a cave that is sometimes restricted; wingspread is 3 ft.

clear across and perhaps still continues beneath the external veneer of rock. The entrance is shaded by several tall, scarlet immortelle trees all solidly draped with waving moss.

Parakeets screeched past by the hundred, divided into pairs which merged with the flock, but always separated again. In the very entrance were three tall wooden crosses, the central one largest. Bunches of roses, old and faded, were tied to the crosses. As we dismounted, six men came out, Basque priests from their accent. Two were clad in bathing trunks and all were smeared with black mud on body, limbs and face, and they donned white surplices at the entrance. One had a cluster of small, black-backed cave rats.

A very definite breeze blew out of the cave, cold on our heated faces. A hundred yards inside our breath became visible as a mist. As we waited, a glowing blue morpho butterfly and later a second fluttered past out of the sunshine and warmth into the cave, high up among a maze of stalactites and on out of sight. They did not return. One could think of these as flying in as beautiful butterflies and, changing into Oilbirds, flying out at night. Dracula stuff.

Looking in from outside, huge stalactites could be seen, and within the entrance there seemed to be winding, ascending stairways on each side, with balustrades of stalactites and stalagmites. The larger ones, near the outer air, had small festoons of ferns growing on them, but no other vegetation was visible. One hundred yards inside a weird sound became audible, more of a snarling than anything; the unceasing calling of the Oilbirds from high overhead. We had powerful headlights with batteries and these gave light enough to see the birds on their ledge nests and when they flew owl-like over our heads. The sound of the birds was a screeching snarl, together

with an undercurrent as of a hundred typewriters clicking ceaselessly. It has been established that (as in bats) it is by the sonar functioning of these clicks and snaps that these birds orient themselves in flight in the absolute darkness of their subterranean home, and in their nocturnal search for the seeds of palms. The snarling had a liquidity which was inimitable. There was something sinister about the uproar in common with the roaring of Howling Monkeys. It was wholly unbirdlike, but not inappropriate when emanating from these mysterious creatures, whose home was an underground cavern, whose day consisted of a scant hour or two of dusk and dawn out of the twenty-four.

It is difficult to imagine a greater contrast in bird voices than that between the crisp *Whippoorwill* or the sharp, distinct *Whoareyou* of the Nighthawk and the raucous vocal turbulence of the Oilbirds.

Even if we could not have seen or heard the birds their haunts were definitely demarcated by windrows of nuts and seeds, almost a pure culture of fruit of the Turu Palm (*Jessenia oligocarpa*), looking like nutmegs with striped, fibrous outer coat. At considerable distances the birds search for these at night, return, digest the thin, outer, fleshy coat and regurgitate the seeds which fall to the floor of the cave. The entire floor was covered with rows of dead and dying, sprouted stalks, 12 or 18 inches tall, spindly and bleached white. By searching I discovered two small, white palm fronds, and a single oval leaf which had found some means of fashioning themselves without chlorophyll. It was the most desolate expanse of vegetation I have ever seen.

The most evident sign of life, as we flashed the lights about the ghostly forest, was hundreds of crickets which leaped in all directions. They were pale brown and of many sizes, big ones with tremendously long antennae, and tiny leapers which looked like out-sized fleas. Large numbers were resting on the lower part of the walls and stalagmites. Fluttering from stalk to stalk were small white moths, and under stones we found whip scorpions, showing little pigmental reduction

ostly forest of light-starved seedlings sprouted seeds regurgitated by the Oilbirds is a common rence in caves inhabited by these birds. Rarely re light enough for them to reach any size.

And all the time there came from overhead the harassing snarls, mingled with baby bird complaining which we knew were not baby birds, and croaks which recalled real crows.

We went on and on, clambering over gigantic boulders or creeping between monoliths. The Oilbird chorus died down and the darkness seemed denser than before. Then a noise sounded softly in the distance and we entered another cathedral of howling devils snarling and flapping against the lofty ceiling. More seeds and more hopeless sprouts. Then we slid through a narrow, oblique, tight-fitting slope, a fat man's misery, floored with black soppy mud a foot in depth, and we slithered over smooth rocks so that all our clothing was matted and black. And always we marvelled because the chambers were air-conditioned, the air pure and cold, and a third mighty room with a third colony of Oilbirds was approached and passed.

The next narrow corridor led down into a shallow stream, with tinkling rapids and a midget waterfall — the only sounds except the birds which the cave permitted. We waded in this for a hundred yards and then I caught sight of a white fish swimming over the sandy gravel. I had my net in readiness and a scoop gathered him in. Again and again this happened and with ten scoops I secured nine fish. In the hand they showed as pinkish-white with minute black dots for eyes. They made no effort to avoid the net, being apparently quite blind. The six short barbels and wide mouth identified them as catfish.

We passed from one lofty chamber to another, the connection being usually through narrow funnels. The lime formations were very beautiful and of great variety. In one smaller room were thousands of small points of lime, in another immensely long curtains or portières hung down, the folding being as delicate and intricate as lace or silk. In one place twenty or more stalactites hung close together like organ pipes and one of us played on them with the handle of the net.

On our return trip the first view of the entrance was sheer luminosity, the three crosses, tiny by distance, set in a delicate mist of greenery on the opposite cliff.

The birds were said to leave the cave around six o'clock but at six-thirty, from outside on mule-back, I could hear them getting nearer and nearer, now loud, now very low. They reached the outermost lofty chamber and fluttered near the entrance before the first bird actually swung out. As I left all began to appear, silent and owl-like. Those which emerge first are said to return and allow their mates to take their turn, but this is hearsay.

As my mule trotted along the trail I heard a single last snarl from the darkness overhead.

TRINIDAD'S OILBIRDS ARE YIELDING NEW FACTS

By David Snow

Resident Naturalist, Simla

Soon after my arrival at the station of the Department of Tropical Research at Simla in March, 1957, I visited the Oilbird colony on the Spring Hill estate at the head of the Arima Valley. With a ladder I got up to six of the nests and found that one nest contained one absolutely clean egg; the breeding season was just beginning. Since then I have devoted a good deal of time to the Oilbirds and have paid regular visits to this cave and less frequent visits to other caves. This is an interim report on a study which is still continuing.

The Spring Hill colony is particularly well suited for study. The birds live, not in a dark cave as most Oilbirds do, but in a deep gorge down which flows a small stream. The gorge is roofed over in places but for the most part is open to the sky, and in the middle of the day the sunlight, entering vertically, illuminates most of the interior. Moreover the nests are placed on ledges only 15 feet, or less, above the stream bed and can easily be reached by ladder.

There has been no precise information hitherto on the breeding season of the Oilbird. In most caves it is very difficult to ascertain the contents of the nests, and in any case a single visit in a season, on which previous statements have been

Entrance to the Oilbird Cave on the Spring Hill estate is a picturesque cleft in the rock wall, through which a small stream rushes. Dim light filters into the cave from breaks in the roof.

based, cannot yield the required information. However, most writers have agreed that breeding must start in the early months of the year, while Cherrie alone (*Sci. Bull., Mus. Brooklyn Inst.*, 1, 1908, p. 368) states that there is a second breeding season in the autumn. My observations so far have shown considerable irregularity in times of breeding and it is clear that records extending over two or three years will be needed before generalizations can be made. Of the eleven pairs which nested in 1957, four laid their eggs in March, five in April, one at the beginning of May and one in July. Two of them lost their eggs and made second attempts (in May and July); two more pairs lost their eggs or young but made no second attempt that year. Altogether eight pairs reared young successfully. After raising their first brood two pairs started again, in August and September, but the others did nothing further and from the abundance of feathers which were dropped below the nests it was evident that many birds were moulting. Then, quite

Dr. Snow investigates six nests in the Spring Hill cave. Most of them were easy to reach by ladder from the bed of the stream in the cave.

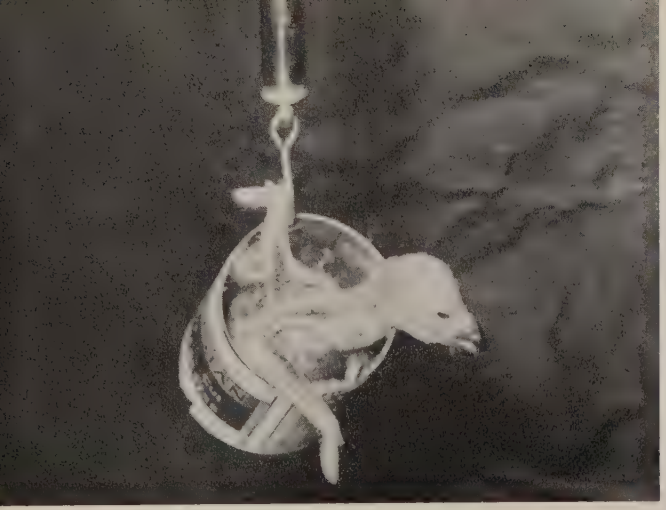
Both eggs and a very young bir visible on this ledge — as well number of colorless seedlings have sprouted in the shallow

inexpectedly, in December four pairs laid again, and a fifth followed in early January, 1958. It looked as if another main breeding season was starting, but all except one of the five lost their eggs or young and it was not until March that most of the pairs began to nest, approximately the same time as last year.

The whole tempo of nesting is very slow. To begin with, there are unusually long intervals between the laying of successive eggs, anything up to nine days but most often about four or five days. The birds must incubate pretty regularly from the time the first egg is laid because the eggs hatch in the order in which they are laid and at about the same intervals. The incubation period is about 33 days.

When first hatched the young bird is naked except for some short sparse down on the under side. At the age of about a week the rudiments of a second set of down feathers appear as dark points beneath the skin, on both upper and lower surface. A week later these rudiments are conspicuous black streaks under the skin. At the age of about three and a half weeks this second generation of down feathers bursts out, and for the next month the young bird is clad mainly in gray down. The next plumage that grows and gradually replaces the down is of adult type; there is no distinct juvenile plumage.

A great deposit of fat is laid down by the growing Oilbird and it is this that has led to their exploitation by the natives of Venezuela and Trinidad. At hatching they weigh about ½ ounce. They increase rather slowly in weight for the first week, then more quickly, until at the age of about 70 days they weigh as much as 23 ounces, a large part of which is fat. Then for the next 30 or 40 days they lose weight, reaching about 14 ounces, by which time their wings have reached full length and they are able to fly. The total nestling period, from hatching to flying, has been rather variable in different nests, ranging from about 95 days to 120. I think that the differences may partly have been due to different food, a topic which I shall discuss later. The very long period of development, longer than in any other land bird of comparable size, may be an adaptation to the very specialized fruit diet on which the birds feed both themselves and their young. This diet is probably very poor in proteins



Young Oilbirds in various stages of development. At the upper left a 21-day-old nestling is weighed. A considerable part of the weight during the first 70 days is fat. Upper right: a nestling at 50 days. At lower right: 61 days old, but not yet able to fly.

and may not permit a faster development, but this is a problem which I have not yet studied.

Soon after starting to observe the Spring Hill colony I fixed two catching trays below the nests, at points where the conformation of the cliff channels the falling seeds which the birds regurgitate as they sit on the nests. As Dr. Beebe has explained in the previous article, Oilbirds leave their caves at night and bring back large quantities of fruit which they digest during the day. With very few exceptions these fruits are of the same general type — they are more or less fleshy and contain a single relatively large, hard seed. Only the fleshy pericarp is digested, the seed being regurgitated. It has generally been stated that palm fruits are the Oilbird's main food, but one or two previous accounts mention the fruit of "laurels" (Lauraceae) and other trees. My collections from the catching trays, now totalling over 40,000 seeds, have shown that palm fruits are an important and constant part of the diet but that fruits from other trees have a prominent place and may for weeks on end easily outnumber the palms. Among the non-palms, the Lauraceae are the chief family, but a tree locally called "Incense" (probably *Protium* sp., but as yet unidentified) is very important, its seeds having outnumbered all the others for a period of several weeks this year. It was during the period when Incense fruit was dominant in the food that the young developed in as little as 95 days. The fruit of the two most important palms, *Jessenia oligocarpa* and *Euterpe* sp., have been present in all my samples in every month of the year and may be considered as the staple items of diet, but the Lauraceae and other non-palms, as well as the palm *Bactris cuesa*, are highly seasonal. Some of the fruits taken have been surprising. I sometimes find in my catching trays small numbers of the seeds of the palm *Geonoma vaga*, a small tree not usually more than 15 feet high that grows in the undergrowth of dark forest and bears fruit about a quarter of an inch long, consisting mainly of a hard seed covered by a very thin pericarp. One would have thought that an Oilbird would not find it easy to collect such fruit and certainly that it would not be worth its while. I also find

small numbers of the fruit of an introduced palm, *Livingstona chinensis*, to obtain which the birds must fly at least to Arima, six miles away. Another introduced fruit which is taken in small numbers is that of the Pewa palm (*Bactris utilis*): only the infertile seedless fruits are taken, the fertile ones being apparently too bulky for the birds to manage.

I have not yet found out how much food is brought back nightly by each bird, but the following figures are worth quoting. Two nearly full-grown young birds, which fell from their nests during a visit to a sea cave on the north coast of Trinidad and were taken back to Simla before being successfully introduced into the Spring Hill colony, between them regurgitated 27 seeds of *Bactris cuesa* and 18 of *Euterpe* sp., obviously part of the previous night's feed, representing a total weight before digestion of about 3¾ ounces. One evening I collected all the seeds off one nest which was occupied by a pair of adults without eggs or young, and next day collected from the same nest 118 fresh seeds of four species, representing a total weight before digestion of about 6¾ ounces. This is a minimum figure, since although this pair of birds were tending to eject their seeds onto their nest more than the others, they must certainly have let some fall over the nest edge.

Owing to the conditions of nearly total darkness in which most Oilbirds live, little has been found out about their behavior at the nest. The comparative lightness of the Spring Hill cave is here a tremendous advantage, which I am now trying to exploit. In December last year, with the help of Mr. John Dunston, a keen local naturalist, I fixed up a platform spanning the gorge at a height of about twelve feet above the stream bed and a few feet upstream of the nest-ledges, and on it I placed a small canvas blind. This has enabled me to observe the Oilbirds on their nests from their own level and at a distance of only a few yards. The birds have now become remarkably tame, and though some leave their nests when I enter the hide they are nearly all back again within a few minutes. There is no longer much of the screaming and snarling which one hears continually from birds disturbed in other caves.

Both members of the pair incubate the eggs, and I have several times seen the "change-over," which takes place with no ceremony. The incubating bird gets up and shuffles off the eggs and the other then shuffles on and settles down. The two birds then remain crouching side by side, the incubating bird being a little lower down than the other. Like other cliff-nesting birds, when they defecate they turn until their tail points outwards and eject the faeces clear of the nest. I have occasionally seen birds repairing their nests by plastering regurgitated matter with the side of the beak round the outer edge of the nest. Sometimes birds on adjacent nests engage in tussles which may last several minutes, locking their beaks together and twisting their heads from side to side, squawking hoarsely, and causing considerable excitement among the other birds. Most of the time, however, they sit quietly, occasionally regurgitating seeds, sometimes apparently asleep. Pairs sitting side by side preen each other's heads; the rest of the plumage they preen for themselves. When they scratch their heads they bring the foot up directly, under the wing. So far I have not seen the young being fed, although I have spent a good many hours watching for it, and I suspect that it takes place very early in the morning soon after the old birds return from foraging. This and many other aspects of their behavior remain to be investigated.

The size of the Spring Hill colony has fluctuated markedly in recent years. In 1950, following raids by local people, the site was apparently deserted, but by 1955 there was again a flourishing colony and Dr. Beebe counted about 40 birds in April of that year. In 1957 11 pairs nested, and this year there are 13 nesting pairs and a few other apparently unestablished adults. Doubts have been expressed about the Oilbird's survival in Trinidad. Although they are protected by law, some poaching continues and persistent raids can easily lead to the extermination of small colonies. However, the remoteness of some of the big caves in the mountains, and the inaccessibility of the sea caves, should ensure that part at least of the population will remain little disturbed, while even in the caves which are much visited by poachers there are many high ledges that are unreachable. As long as forest remains on the Northern Range of Trinidad the Oilbirds should be safe.

Peripatus: Fierce Little Giant

By ANNE J. ALEXANDER

Department of Zoology, Rhodes University, Grahamstown, South Africa

Many of the observations described in this article were made during a visit to the station of the Department of Tropical Research of the New York Zoological Society at Simla, in Trinidad, B. W. I. This visit was made possible by the generosity of the New York Zoological Society and the South African Council for Scientific and Industrial Research, to whom I would like to express my thanks.

THE ANIMALS belonging to the Phylum Onychophora are not sufficiently widely known to have what could be described as a "common name." *Peripatus* is really the name of what used to be the largest genus within the phylum, but "Peripatus" is gradually becoming accepted as laboratory slang for all or any onychophorans – and this is the name that they will be given throughout this article.

The Peripatus are usually placed fairly close to the Phylum Arthropoda to which all the inverte brates with jointed legs belong, such animals a the insects, centipedes, scorpions and crayfish They, Peripatus, are small animals, normall about two inches long, though there is in Trini dad a giant among the group, *Macroperipatus* which may be as much as six inches long. Th legs of Peripatus, of which there are a large num ber, from fourteen to forty-one pairs, are no jointed yet they have two claws on each foot, a do so many of the arthropods. Color varies fron species to species and, in fact, within any on species. Although in general they are dark col ored, there is an attractive South African anima which is bright orange with sometimes a blac head and legs, while the large Trinidadian Pe ripatus is a startling purplish color with brillian

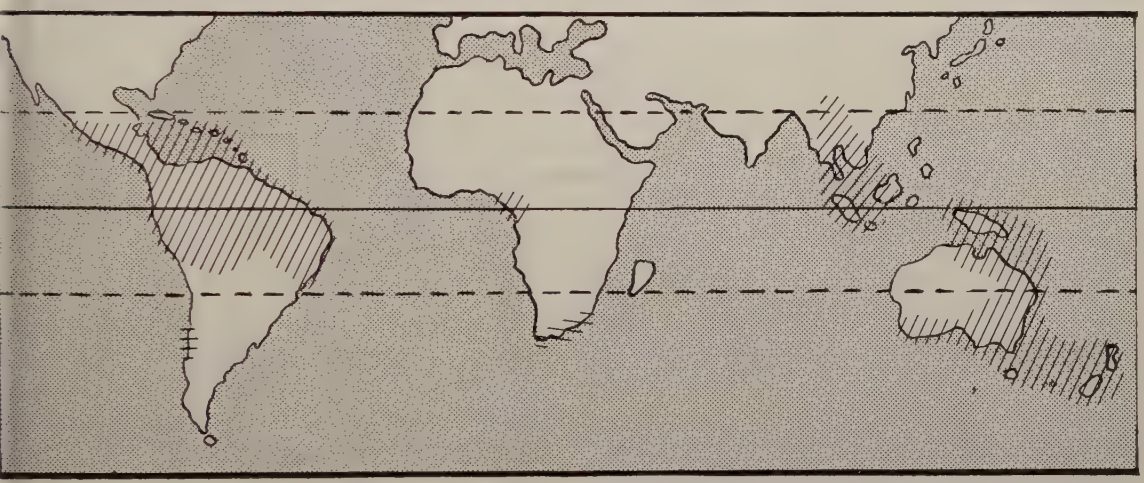
nnary yellow stripes above each eye or across the tack of its head. Their skin is soft and dry and, n most cases, covered with minute sensory papil-ae which give it a velvety quality.

The geographical distribution of Peripatus is ntirely within the tropics and Southern Hemi-phere, as can be seen from the map. This lim-ed distribution does in part explain why they are little known, the other contributing factor be-ng their restricted microhabitat. In general they ve only in fairly moist places, in rotting wood or nder stones in forested areas.

This restriction of habitat appears to depend n the animal's inability to conserve water within ts body. The rate of water loss through the skin s high, largely, no doubt, because of the many nprotected respiratory openings which occur ver the surface of the body. The obvious way to

he birth of a baby giant Peripatus. There may ins, or only a single baby, about a third the of the mother. Below: Peripatus has a world-but highly irregular and spotty distribution.

Photograph by M. Woodbridge Williams, Copyright, National Geographic Society



make good this loss is by drinking—and Peri-patus can and does drink free water when it is accessible, drawing it up into the mouth appar-ently by suction. This, however, is not the only way in which the animal can take up water: in some species, including both of those found at Simla, they can absorb water even when they cannot reach it with their mouths. This is done by means of small thin-walled sacs which can be everted from the bases of the legs. It can easily be shown that a Peripatus which has been desic-cated and then placed on filter paper moistened with some harmless dye will take up the moisture from below it, for the dye will be found within the sacs. Furthermore, where it is possible to watch the ventral surface of one of these "thirsty" Peripatus, it is easy to see that the sacs are everted only in that region of the body directly in contact with the moisture. Many Peripatus have, then, two ways of drinking, either by way of their mouths or their eversible sacs. But, while mouth-drinking is restricted to water in surface droplets or little puddles, the eversible sacs have the advantage that they can be used to draw up water from fine cracks and crevices in the soil or wood.

Another way in which Peripatus limits its water deficit is by avoiding exposure to the heat of the day, for this would increase evaporation of water from the respiratory openings. They have in fact a well-marked rhythm of nocturnal activity, as can be very easily witnessed in the laboratory. This activity seems, at least in one of the South African animals, to be "built-in" to the extent that it persists in total and continual darkness and is independent of temperature variations. Until a recent observation on the giant Peripatus at Simla, an account of which will be given later in this article, there was no evidence that this nocturnal activity occurs in natural conditions. It had been shown in the laboratory but, despite long hours of hunting in the forests, nobody had ever seen even a single Peripatus coming out from its leaf or wood cover and walking about, either by day or night. Laboratory experiments had, however, suggested that even in pitch

darkness the animals are more inclined to walk just underneath the leaf cover than above it. This sort of behavior in which the animal seeks to keep as close a physical contact as possible with solid objects in the environment is known in other animals; it is called "thigmotaxis" and, in this case, considerably reduces one's chance of noticing a Peripatus by torch light at night.

The animals look such soft inoffensive creatures that one might expect them to have no protective mechanism other than their somewhat cryptic colors and habit of staying absolutely still when disturbed. However they do have a weapon of defense, consisting of a pair of very extensive "slime glands" within the body and two stubby papillae on either side of the mouth. From these latter a shot of slimy fluid can be ejected with surprising accuracy and may travel a distance of as much as 18 inches. This fluid solidifies rapidly on contact with the air and becomes very sticky. Though experiments indicate that it has no poisonous properties, it does effectively ensnare the small arthropod enemies against which it is usually used, so that Peripatus gets a good chance to escape.

When Peripatus was initially discovered it was thought to be closely related to the slugs and was in fact given the name of *Limax,* that of a genus of slugs. It is thus not surprising that it was thought that Peripatus fed on vegetable matter. Later it was stated that the animals lived on the flesh of other arthropods, insects in particular and, in spite of its harmless looking appearance, one of the early naturalists illustrates a Peripatus "rampant," shooting slime at its prey. Although this sounds perfectly reasonable, the scientists who later studied Peripatus concluded that it lives mainly on the microfauna – that it catches little insects using its small but spiky jaws. True, Peripatus will eat crickets in the laboratory, but it was considered that this was possible only because the insects were already dead when offered as food. However my observations on Peripatus in South Africa have shown that they can and will spit at arthropods which they could not hold but for the use of the slime; once ensnared, the Peripatus will advance upon the insects and eat them.

It was therefore of great interest to discover that both of the Trinidadian Peripatus also spit at their prey when it is large and active enough to warrant such behavior. Frequently the Peripatus will fold back its antennae as it goes in to begin feeding on the struggling insect which has just been entangled. Dr. William Beebe, watching one such attack by a giant Peripatus upon a cricket at Simla, remarked "That Peripatus looks so fierce that I expect to hear it snarl at any moment."

Nevertheless, there was still no evidence that offensive spitting also occurs in natural conditions. As has already been pointed out, it was asking a lot from luck to expect to find a Peripatus at all at night, but to hope to find one which was eating its freshly caught prey really seemed wildly over-optimistic. However, at about half past eleven one February night, as I was walking along one of the traces in the Simla jungle looking for insects to feed my scorpions, the beam of the torch showed up the shiny high-lights on a cricket's skin. When I knelt down to catch the cricket, I found that a giant Peripatus had got there before me – she was standing beside the insect and slowly eating her way into its body. What was even more interesting was that the cricket's body was covered with fresh slime, so much so that it partly stuck to a nutmeg kerne

There are two species of Peripatus in Trinida this is the smaller form, only about two inc length. We have occasionally exhibited this c creature, but it prefers to remain hidden by

that lay beside it. With the Peripatus, the cricke and the nutmeg I rushed back the couple o miles or so to the laboratory. As soon as the Peripatus was left in peace in a dish she went back immediately to eating her cricket. Her phlegmatic behavior was in no wise reflected in he observer for, in a single lucky observation, I had obtained good evidence not only for natural noc turnal activity but also of Peripatus feeding o relatively large insects which it traps in its slime

The reproductive biology of Peripatus is i some ways just as strange and interesting as thei behavior. Although some of the Australian spe cies do lay eggs, the rest give birth to livin young, sometimes one at a time, but sometime twins and sometimes as many as ten babies at once The giant Peripatus of Trinidad gives birth t

ther a single baby or twins; in either case they e about one-third as long as the mother — that , relatively enormous as babies. The mother oes not seem to pay any attention to the young uring their birth and afterwards even to recog-ize them. One possible exception to this is a outh American animal which, it appears, may ormally carry the newly born young on her back r some time.

Nobody yet knows how long a Peripatus can ve. Dr. Manton of Kings College, London, ept them up to six years in captivity and con-ders it unlikely that the species with which she as dealing live more than a few years beyond is age. It is known that they gradually darken rom an attractive baby-pink to their final color

s they grow older and that, even after they are nature, they shed their skins fairly often — about nce a fortnight. The split in the skin starts over ne head and then extends along the middle of ne back. Although the hard covering of the jaws shed with the rest of the skin, this does not pre-ent the newly moulted Peripatus from turning ound and eating its old skin, sometimes starting efore it is entirely free from the body.

In only one species have animals been reared maturity in captivity; these appeared to mate at bout a year old. The actual details of fertiliza-on are known for only one of the two families nd in this, the Peripatopsidae, the procedure is ery extraordinary. The male deposits spermato-hores, little packages enclosing sperm, anywhere n the body of the female; then, at the point of contact between the spermatophore and the body, the wall of the spermatophore and the skin of the female begin to disintegrate. As a result, the sperm are liberated into the body cavity of the female. Eventually they pass into the genital ducts and fertilize the eggs while the empty spermatophore shrivels and is cast off with the next moult. In the other family, the Peripatidae, we have no information about the process but it seems possible that it is not the same as in the Peripatopsidae. In the giant Peripatus of Trinidad, which is one of the Peripatidae, there were no signs of any spermatophores being stuck onto the females during the time that they were under observation at Simla. There are, moreover, reports that entire spermatophores have been found within the genital ducts of females of this family. The spermatophores are much larger than those of the Peripatopsidae and it is possible that in the Peripatidae some more orthodox type of mating occurs.

This is but one of the large number of problems about Peripatus which still await solution. This animal was once thought to be the "missing link" between two great invertebrate groups, the annelids, containing the familiar earthworms and the leeches, and the arthropods, comprising the insects, centipedes, scorpions and so on. Peripatus has further aspired to the title of "living fossil" because animals which were clearly "Peripatus" had been described from the middle and even the lower Cambrian, nearly 500,000,000 years ago. With added information about the subject we have tended to modify our views about the importance of Peripatus as a "missing link" and most authorities nowadays would only say tentatively that "a peripatus-like animal may have stood somewhere near the base of the arthropod evolutionary tree." Moreover other, bigger or more recently discovered "living fossils," such as the coelacanths and the mollusc, *Neopilina,* have outshone the little Peripatus. Yet, without these romantic-sounding titles, Peripatus is still as fascinating to the zoologist as ever. There is still much that we have to learn of these creatures and we may be led by future discoveries about their biology, behavior and physiology to a clearer understanding of that "higher" and more "completely studied" group, the Arthropoda.

News from the Conservation Foundation

New Publications

Three books have been published by the Conservation Foundation since the last issue of ANIMAL KINGDOM. One is *The Law of Water Allocation in the Eastern United States,* edited by David Haber and Stephen W. Bergen, which presents the papers and proceedings of a symposium in Washington, D. C., in October, 1956. We understand that much of the thinking developed at this symposium has influenced significant water programs and their legal interpretation in a number of states. The second book is *Living Resources of the Sea* by Lionel A. Walford. This volume is of interest not only to the marine researcher but also to the layman interested in our marine resources. The purpose of this book is not just to describe what we know about the sea and its vast resources, but rather to point out what we do not know and those areas urgently in need of further study. The third volume is *Resource Training for Business, Industry, Government,* published by the Conservation Foundation for the Natural Resources Study Committee. This little book includes the proceedings of the first Ann Arbor Conference in 1956 as well as a number of articles by men actually working in fields where resource training is needed. It clarifies objectives and methods of graduate training for the sort of resource work required in business, industry and government.

Vanishing Open Spaces

Urban sprawl is the "bad word" for unplanned suburban growth. Many urban centers of the United States now suffer more and more from this kind of development on their fringes that needlessly chews up every open space and spreads population and essential services too thinly. Farming areas are prematurely bought for speculation, the suburban resident quickly loses local recreation space and central business districts decline.

A pamphlet by P. M. Stern of the Foundation staff on this resource development issue was recently sent to 400 newspaper and magazine editors. Specific suggestions included exclusive agricultural zoning, acquisition of developmen rights by state governments and emergency com munity action to acquire strategic green land especially valuable for natural features.

Dr. Osborn Speaks at Detroit

On June 3 Dr. Osborn delivered an addres before the national convention of the Genera Federation of Women's Clubs at Detroit in whic he stressed the need to understand the conse quences of our current rapid population growth especially as it affects our available resources. H concluded by saying, "I began this address as end it — with the plea for *quality* rather tha *quantity* in our national aspirations." His tal has received wide recognition and favorabl comment.

Education Program

Dr. Paul F. Brandwein has spent the last fe weeks in California and the Southwest where h has been observing the teaching of conservatio in the Western schools. He also made arrange ments for the establishment of a Conservatio Foundation Curriculum Study Center at the Sa Fernando State College at Northridge, Califo nia, which will be under the direction of Mis Elizabeth Hone.

Forest Spraying

Early in June Roger Hale and Stephen Berge spent a few days in Caribou, Maine, observin the airplane spraying of 300,000 acres of spruce fir forests for the control of the spruce budworm In connection with this spraying, we are conduct ing a research program on the effects of DDT o spruce-fir forest growth, as reported in the las issue of ANIMAL KINGDOM.

New Staff Appointment

On July 1 Richard A. Cooley joined our staf as Research Associate. He has spent a number o years with the Alaska Resource Developmen Board and has recently completed his doctora studies in the School of Natural Resources, Un versity of Michigan.

BEHIND THE SCENES

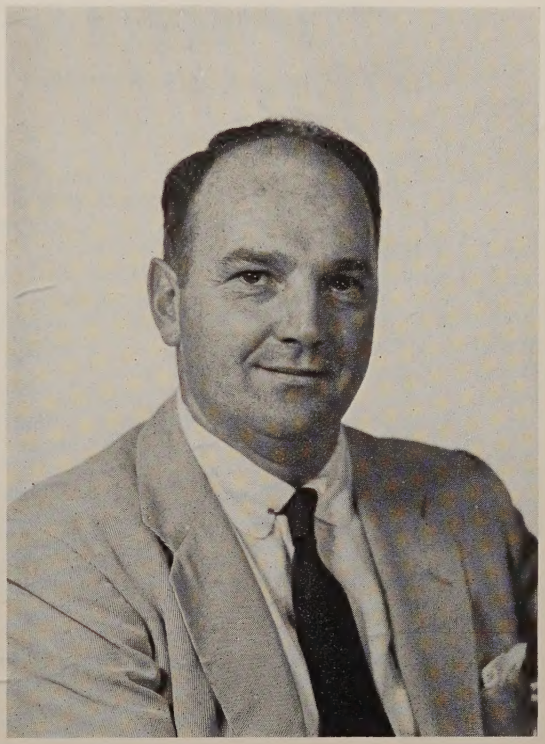
NEWS AND NOTES OF THE ZOOLOGICAL PARK, THE AQUARIUM AND THE DEPARTMENT OF TROPICAL RESEARCH

Dr. Oliver Named Director of Zoological Park

Dr. James A. Oliver has been appointed Director of the Zoological Park, effective June 27. Dr. John Tee-Van continues in the position of General Director of the Zoological Park and the Aquarium.

Dr. Oliver has been Curator of Reptiles since Sept. 1, 1951, and Assistant Director since April 28 of this year. He is a native of Caruthersville, Mo., and a graduate of the University of Michigan where he received his doctorate in 1942. From 1943 to 1946 he served on destroyers in the Navy. In 1947 he became an Assistant Curator on the staff of the American Museum of Natural History and was an Associate Curator from 1947 to 1948. For the next three years, before coming to the Zoological Park, he was Assistant Professor of Biology at the University of Florida.

With Dr. Oliver's appointment the Zoological Society reverts to a directorial system under which both the Zoo and the Aquarium have their own Directors, with Dr. Tee-Van exercising overall supervision. Dr. Oliver is the fifth Director of the Zoo: Dr. William T. Hornaday served from 1896 to 1926, Dr. W. Reid Blair from 1926 to 1940, Allyn R. Jennings in 1940-41, and Dr. Tee-Van (after a period as Executive Secretary) from 1952. He became General Director in 1957.



Dr. James A. Oliver

IN BRIEF

Nerve-blocking. Early in his studies of the effects of the powerful Sea Cucumber poison, Holothurin, Dr. Ross Nigrelli noticed that fishes exposed to the substance behaved as if their nervous systems had been affected. Now Drs. S. L. Friess and E. R. Whitcomb of the National Institutes of Neurological Diseases and Blindness have discovered that Holothurin acts as a powerful blocking agent for nerve impulses, comparable in magnitude to the standard drug used for this purpose. The point is not that Holothurin will ever replace the drug, but that it may well show us new things about how nerve impulses operate.

It's "Dr. Ray" Now. Carleton Ray, Assistant to the Director of the Aquarium, was granted the degree of Ph.D. by Columbia University in June. His thesis was on "The Application of Bergmann's and Allen's Rules to Cold-blooded Animals."

Spring Babies. Many of the deer corrals now contain their usual spring quota of fawns. Jaguar cubs were born on June 24; they are three in number, and all males, and are being reared by their own mother in the Lion House. For the next few weeks they will be at their playful best.

PUBLICATIONS OF INTEREST

TALKING OF ANIMALS. By David Fleay. 56 pp., 52 illus., Jacaranda Press, Brisbane, 1956. 13 shillings 6 pence.

Appropriately, a bright-eyed Platypus adorns the cover of "Talking of Animals," for David Fleay is "the Platypus Man" who twice in the past eleven years has brought Australia's greatest mammal treasure to the Bronx Zoo. "Talking of Animals" is just as chatty, in formal and unpretentious as its title indicates — and ye as packed with information as one would expect in conversation about animals with a man whose whol life has revolved around the Australian fauna. Mr. Flea devotes separate short, anecdotal, but always informa tive chapters to about 30 of Australia's mammals, bird and reptiles with which he has had close (sometimes to close) contact. The photographs, by Mr. Fleay, ar mostly large and are excellent. — W. Br.

New Members of the New York Zoological Society

(Between May 1 and June 30, 1958)

Patron

Will C. Grant
Miss Alice Tully

Life

Mrs. Robert Holt
Ilia A. Tolstoy

Supporting

Mrs. Dumont Clarke
James M. Doubleday
Wilbur Downs
Mrs. A. W. Erickson
Henry J. Heinz, II
Miss Helen M. Holmes
Russell C. Leffingwell
Mrs. John E. Post
Mrs. A. Hamilton Rice
William A. Rockefeller
Peter Stuyvesant
Miss Joan Van Orden

Contributing

Louis C. Baker
Frederick Bruell
Mrs. Antoinette M. Bunker
Mrs H. Schuyler Cammann
Mrs. Cass Canfield
W. Macy Chamberlin
Mrs. W. Macy Chamberlin
Mrs. Eversley Childs, Jr.
Mrs. Mimi Cohane
M. G. Connally
Miss Ursula Corning
Mrs. Wilbur A. Cowett
Mrs. Frederick M. Davenport, Jr.
Watson Beach Day
William D. deCamp
Mrs. Truman Bartlett Douglass
Leonard J. Essman
Bernard F. Gimbel
Robert K. Ginsberg
Edward Groth, Jr.
William H. Hernstadt
Mrs. Thomas B. Hess
Ernest R. Heyde
James R. Hillas, Jr.
Mrs. Thomas Hitchcock
Mrs. Iris Lavac
Miss Geraldine T. Lister
Mrs. Robert A. Lovett
Miss Adele Marie
Paul W. McQuillen
Mrs. Charles S. McVeigh
Dr. Katharine Merritt
Mrs. Stanley G. Mortimer, Jr.
Mrs. Vernon Munroe, Jr.
Mrs. Warren O. Nelson
Constantine Nickou
Mrs. Charles S. Payson
Miss Frances Poe
Dr. Dominick J. Principato
Mrs. William H. Reid
Miss Ethel M. Shrewsbury
Mrs. F. J. Starzel
Harvey Stevenson
Mrs. Robert C. Stover
Mrs. Carll Tucker, Jr.
Gilbert Walerstein
Mrs. Philip B. Weld
Charles S. Williams
Horace H. Wilson

Annual

Townsend E. Anschutz
Mrs. Elizabeth A. Baird
Mrs. Gily E. Bard
Walter Bastedo
Miss Irma Berger
Leonard Bergstein
Mrs. A. S. Birsh
Del H. Brand
Dr. Paul F. Brandwein
Harold E. Bruce
Louis Casanave
Miss Deborah E. Clark
Mrs. Douglas Clephane
Abraham Concool
Kenneth A. Cowin
Dr. Janice A. Cutler
A. M. Davis, Jr.
Leonard L. Davis
Walter Drey
Irwin G. Freydberg
Mrs. Harvey D. Gibson
Mrs. Joseph W. Gleicher
Master Kim S. Gudgeon
Mrs. Hamilton Hadley
A. Nelson Hall
Miss Elizabeth Halsey
John F. Hamberger
Minard Hamilton
Murray Handwerker
F. Kenneth Harder
Frank K. Harder, Jr.
Mrs. Elizabeth S. Hausner
Dr. Robert Healy
Mrs. William Heitner
Dr. Alfred R. Henderson
Miss Bertha Hernstadt
Miss Frances A. Jones
Frederick Jones, Sr.
Theodore Kahn
Mrs. Eva Wehnes Knox
Done Ot Koon
Geza Korda
David I. Kronenberg
Master Nicky Leggett
Jonathan Lehman
Miss Laura H. Leonard
Mrs. Wallace A. Lindquist
Dr. Rudolph M. Loewenstein
Miss June Lord-Wood
Milton R. Marks
John J. Messmann
Michael F. Mayer
John J. McCullough, Jr.
Mrs. Algernon Miller
Antonio O. Gomez Miranda
Mrs. Frederick B. Nestler
Juan Ortega
Mrs. Constance G. Papez
William T. Perry
Roger T. Peterson
John L. Rayward
William M. Redecker
John H. Roos
Fred Rosenstiel
Rudolph Rosiello
Simon Schaub
Mrs. Ralph T. Schrenkeisen
Mrs. Albert Schwartz
Roger Scudder
Dr. Daniel Shapiro
Jan Piet Stewart
Carl Teitelbaum
Thomas H. Tesauro
William B. Thomson
Louis T. Tieman
Mrs. Kenneth V. C. Wallace
Joseph Watkins
Karl B. Weber
Miss Elizabeth E. Wehnes
Mrs. L. A. Wyman
Miss Katherine J. Zinsser

It's Summer Expedition Time

How long since you—a Member of the Zoological Society—have been at the Bronx Zoo or the Aquarium? This is a good time to make a trip to *both* of these show-places of New York. It's quite simple, especially by automobile. If you'd like to refresh your memory of the automobile routes, a telephone call to the Publications Office in the Zoo (WEllington 3-1500) will bring by return mail a couple of neat little folders with maps showing how to reach the Aquarium and street routings to the Zoo from any direction.*

Just about the time *Animal Kingdom* appears we think our newly-born Jaguar cubs will be old enough to come out and play with their mother. There are three of the babies, born June 24, and as cute as only baby Jaguars can be.

* Bring a friend along. Maybe he'd like to join the Zoological Society, too.

NEW YORK ZOOLOGICAL SOCIETY
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